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10/593,187	09/18/2006	Frederique Cordelle	MM6023PCT	7286

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EXAMINER
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CULLEN, SEAN P

ART UNIT	PAPER NUMBER
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1795

NOTIFICATION DATE	DELIVERY MODE
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06/03/2010

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

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<b>Office Action Summary</b>	<b>Application No.</b> 10/593,187	<b>Applicant(s)</b> CORDELLE ET AL.	
	<b>Examiner</b> Sean P. Cullen	<b>Art Unit</b> 1795	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 February 2010.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The information disclosure statement filed December 12, 2006 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

Regarding applicant's remarks that a legible copy of foreign patent document **EP 403,947** was filed with the application, a legible copy of foreign patent document **EP 403,947** was not filed with the application and attached to the remarks filed on February 19, 2010. A legible copy of foreign patent document **EP 1,403,947** was filed with the application and attached to the remarks filed on February 19, 2010. The foreign document cited on the Information Disclosure Statement filed on December 12, 2006 is the foreign document **EP 403,947** not the foreign document **EP 1,403,947**.

### ***Claim Rejections - 35 USC § 103***

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
3. Claims 1-10 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruhl (U.S. 4,770,955) in view of Itoh (U.S. 2004/0175607).

Regarding claim 1, Ruhl discloses an individual cell for a fuel cell (1) comprising:

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- first (5) and second electrode layers (4) enabling gas transfer through separate gas inlets (11 and 14) dedicated to each of said electrode layers respectively (4 and 5, Fig. 1) having first (C3/L43-61) and a second porosities (C4/L11-32), and
- a solid electrolyte layer (6) located between the two electrode layers (4 and 5, Fig. 1),
- the two electrode layers (4 and 5) consisting of an anode (4) and a cathode (5, Fig. 1),
- at least one of the two electrode layers (4 and 5) having at least a first compact zone (7 and 8, Fig. 1) with a third porosity (C3/L62-C4/L10),
- which is lower than the porosity of the electrode layer (4 and 5) in which the first compact zone (7 and 8, Fig. 1) is located (C3/L62-C4/L10),
- wherein the first compact zone (7 and 8) is a protuberance of the extending into said electrode layer (4 and 5) for forming an area of low porosity disposed adjacent the gas inlet (11 and 14) dedicated to the other electrode layer (4 and 5, Fig. 1).

Ruhl does not explicitly disclose:

- a protuberance of the electrolyte layer

Itoh discloses solid oxide fuel cell (abstract) comprising a compact zone (8b), which is a protuberance (8b) of the electrolyte layer (7, Fig. 2) to seal an electrode layer (2) to form a seal from a single component [0019] to reduce the number of parts [0025], the cost of manufacturing [0016] and increase the strength of the fuel cell stack [0025]. Ruhl and Itoh are analogous art because they are directed to solid oxide fuel cells. Therefore, it would have been obvious to one

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of ordinary skill in the art at the time of the invention to make the individual fuel cell of Ruhl with the protuberance of Itoh to form a seal from a single component to reduce the number of parts, the cost of manufacturing and increase the strength of the fuel cell stack.

Regarding claim 2, modified Ruhl discloses all claim limitations set forth above and further discloses an individual cell:

- the first electrode layer (5) has a first thickness (Fig. 1) and
- said first compact zone (7) has a thickness identical to the first thickness (Fig. 1).

Regarding claim 3, modified Ruhl discloses all claim limitations set forth above and further discloses an individual cell:

- wherein the second electrode layer (4) comprises at least a second compact zone (8) with a fourth porosity (C3/L62-C4/L10),
- the fourth porosity being lower than the second porosity (C3/L62-C4/L10).

Regarding claim 4, modified Ruhl discloses all claim limitations set forth above and further discloses an individual cell:

- wherein the second electrode layer (4) has a second thickness (Fig. 1), and
- a second compact zone (8) has a thickness identical to the second thickness (Fig. 1).

Regarding claim 5, modified Ruhl discloses all claim limitations set forth above and further discloses an individual cell:

- wherein the first electrode layer (5) has a first thickness (Fig. 1) and
- a first compact zone (7) has a thickness identical to the first thickness (Fig. 1).

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Regarding claim 6, modified Ruhl discloses all claim limitations set forth above and further discloses an individual cell:

- wherein a second compact zone (8) is composed is a protuberance

Ruhl does not explicitly disclose:

- a protuberance of the electrolyte layer

Itoh discloses solid oxide fuel cell (abstract) comprising a compact zone (8b), which is a protuberance (8b) of the electrolyte layer (7, Fig. 2) to seal an electrode layer (2) to form a seal from a single component [0019] to reduce the number of parts [0025], the cost of manufacturing [0016] and increase the strength of the fuel cell stack [0025]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the individual fuel cell of modified Ruhl with the protuberance of Itoh to form a seal from a single component to reduce the number of parts, the cost of manufacturing and increase the strength of the fuel cell stack.

Regarding claim 7, modified Ruhl discloses all claim limitations set forth above and further discloses an individual cell:

- at least one bipolar plate (2) adjacent to an electrode layer (5, Fig. 1).

Regarding claim 8, modified Ruhl discloses all claim limitations set forth above and further discloses an individual cell:

- two bipolar plates (2 and 3) adjacent to each electrode layer (4 and 5, Fig. 1).

Regarding claim 9, modified Ruhl discloses all claim limitations set forth above and further discloses an individual cell:

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- wherein the bipolar plate (2 and 3) has a coefficient of thermal expansion (C2/L48-C3/L12) higher than the coefficient of thermal expansion of the adjacent electrode layer (4 and 5) and the electrolyte layer (6, C3/L43-C4/L32).

Regarding claim 10, modified Ruhl discloses all claim limitations set forth above and further discloses an individual cell:

- wherein the bipolar plate (2 and 3) is connected to the adjacent electrode layer (4 and 5) by nesting (Figs. 1 and 3, C2/L48-C3/L12).

Regarding claim 16, modified Ruhl discloses all claim limitations set forth above and further discloses an individual cell:

- comprising at least a first gas inlet (14) dedicated the cathode (5) such that the entire area of the anode (4) adjacent to said first gas inlet (14) is a compact area (8) of the anode (4, Fig. 1)
- at least a second gas inlet (11) dedicated to the anode (4) such that the entire area of the cathode (5) adjacent to each second gas inlet (11) is a compact area (7) of the cathode (5).

Regarding claim 17, modified Ruhl discloses all claim limitations set forth above and further discloses a fuel cell comprising:

- a stack of cells (20)
- each cell being separated from its neighbor by a bipolar plate (2 and 3, Figs. 1 and 3).

Regarding claim 18, modified Ruhl discloses all claim limitations set forth above and further discloses a fuel cell:

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- with a circular plane geometry (Fig. 2).

4. Claims 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruhl (U.S. 4,770,955) in view of Itoh (U.S. 2004/0175607) as applied to claim 10 above, and further in view of Fischer et al. (U.S. 3,554,808).

Regarding claims 11, 12, 14 and 15, modified Ruhl discloses all claim limitations set forth above and further discloses an individual cell:

- wherein the compact zone (7 and 8) is adjacent to the gas inlet (11 and 14).

Ruhl does not explicitly disclose:

- wherein the bipolar plate comprises at least a protuberance and
- the adjacent layer comprises a cavity,
- said protuberance of the bipolar plate and the cavity fitting one into the other.
- wherein the cavity is located in an adjacent to the gas inlet of the electrode layer.
- wherein the cavity is larger in width than the width of the protuberance of the bipolar plate.
- comprising a plurality of cavities.

Fischer et al. discloses a solid oxide fuel cell (abstract) wherein a bipolar plate (5') comprises at least one protuberance (Fig. 4) and the adjacent layer (4') comprises a cavity (15), said protuberance (Fig. 4) of the bipolar plate (5') and the cavity (15) fitting one into the other (Fig. 4); wherein the cavity (15) is located in a adjacent to the gas inlet (18) of the electrode layer (4'); wherein the cavity (15) is larger in width than the width of the protuberance (Fig. 4) of the bipolar plate (5'); and comprising a plurality of cavities (Fig. 4) to produce a gas tight fuel cell



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(C4/L3-20) to increase the efficiency of the fuel cell stack. Ruhl and Fischer et al. are analogous art because they are directed to solid oxide fuel cells. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the individual cell of modified Ruhl with the protuberance and cavity of Fisher et al. to produce a gas tight fuel cell to increase the efficiency of the fuel cell stack.

Regarding claim 13, modified Ruhl discloses all claim limitations set forth above, but does not explicitly disclose an individual cell:

- wherein the cavity is located in a protuberance of the electrolyte layer.

Itoh discloses solid oxide fuel cell (abstract) comprising a compact zone (8b), which is a protuberance (8b) of the electrolyte layer (7, Fig. 2) to seal an electrode layer (2) to form a seal from a single component [0019] to reduce the number of parts [0025], the cost of manufacturing [0016] and increase the strength of the fuel cell stack [0025]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the individual fuel cell of modified Ruhl with the protuberance of Itoh to form a seal from a single component to reduce the number of parts, the cost of manufacturing and increase the strength of the fuel cell stack.

5. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruhl (U.S. 4,770,955) in view of Fischer et al. (U.S. 3,554,808).

Regarding claim 19, Ruhl discloses an individual cell comprising:

- an anode layer (4),
- a cathode layer (5),

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- a solid electrolyte layer (6) located between the anode layer (4) and the cathode layer (5, Fig. 1),
- a bipolar plate (2 and 3) adjacent to each of the anode (4) and cathode layer (5, Fig. 1),
- each of the anode (4) and cathode layer (5) comprising a dense zone (7 and 8) having a thickness equal to the thickness of the corresponding anode (4) and cathode layer (5, Fig. 1)
- the porosity of the dense zone (7 and 8) being larger than the porosity of the corresponding anode (4) and cathode layer (5, C3/L62-C4/L10),
- wherein the compact zone (7 and 8) is adjacent to the gas inlet (11 and 14).

Ruhl does not explicitly disclose:

- a cavity adjacent to the gas inlet wherein a corresponding protuberance of the adjacent bipolar plate can fit.

Fischer et al. discloses a solid oxide fuel cell (abstract) wherein a cavity (15) adjacent to the gas inlet (18) wherein a corresponding protuberance (Fig. 4) of the adjacent bipolar plate (5') can fit (Fig. 4) to produce a gas tight fuel cell (C4/L3-20) to increase the efficiency of the fuel cell stack. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the individual cell of modified Ruhl with the protuberance and cavity of Fisher et al. to produce a gas tight fuel cell to increase the efficiency of the fuel cell stack.

Regarding claim 20, modified Ruhl discloses all claim limitations set forth above and further discloses:

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- comprising gas inlets (11 and 14) for one of the anode (4) and cathode (5) located in dense zones (7 and 8) of the other anode (4) and cathode (5, Fig. 1).

6. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ruhl (U.S. 4,770,955) in view of Itoh (U.S. 2004/0175607) as applied to claim 1 above, and further in view of Meacham (U.S. 5,527,634).

Regarding claim 21, modified Ruhl discloses all claim limitations set forth above, but does not explicitly disclose an individual cell:

- wherein said first compact zone is composed of the densified material from which the electrode including the said compact zone is made.

Meachem discloses an individual cell (Fig. 2) wherein a first compact zone (7) is composed of a densified material (9) from which the electrode (6) including the said compact zone is made to prevent gas leakage and avoid any capillary paths between the gas inlet (C6/L9-28) to improve the efficiency of the fuel cell. Ruhl and Meachem are analogous art because they are directed to solid oxide fuel cells. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the individual fuel cell of modified Ruhl with the densified material of Meachem to prevent gas leakage and avoid any capillary paths between the gas inlet to improve the efficiency of the fuel cell.

### ***Response to Arguments***

7. Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sean P. Cullen whose telephone number is 571-270-1251. The examiner can normally be reached on Monday thru Thursday 6:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley can be reached on 571-272-1453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. P. C./

Examiner, Art Unit 1795

/Robert Hodge/

Primary Examiner, Art Unit 1795